INTERNATIONAL SOLDIER SYSTEMS CONFERENCE AND EXHIBITION 2004

Joint Precision Airdrop System Advanced Concept Technology Demonstration (JPADS ACTD)

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The Science Behind the Warrior: Yesterday, Today and Tomorrow

OVERVIEW

- **JPADS is Overarching Program for a Family of Precision Airdrop Capabilities**
  - What is JPADS & JPADS ACTD
  - History
  - Scope – Family of Systems
  - Technologies – Planner, 2Klb Decelerators, 10Klb Decelerators
  - Related efforts

- **Purpose: Illustrate the Case for a Capability of Routine Strategic, Operational and Tactical Precision Aerial Resupply**

WHAT IS JPADS?

Common Mission Planner Hardware/Software

Steerable Canopy

Electro-Mechanical Steering Actuators

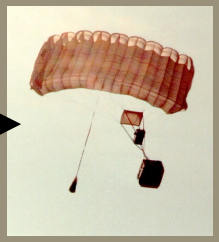
Airborne Guidance Unit

Enhanced Container Delivery System

FAMILY OF SYSTEMS FOR DIFFERENT WEIGHT RANGES

- **EXTRA LIGHT VERSION~220-2,200 LBS**
- **LIGHT ~2,201-10,000 LBS (ACTD)**
- **MEDIUM ~10,001-30,000 LBS**
- **HEAVY ~30,001-60,000 LBS**

SOF/USMC/ Army Small Team Resupply



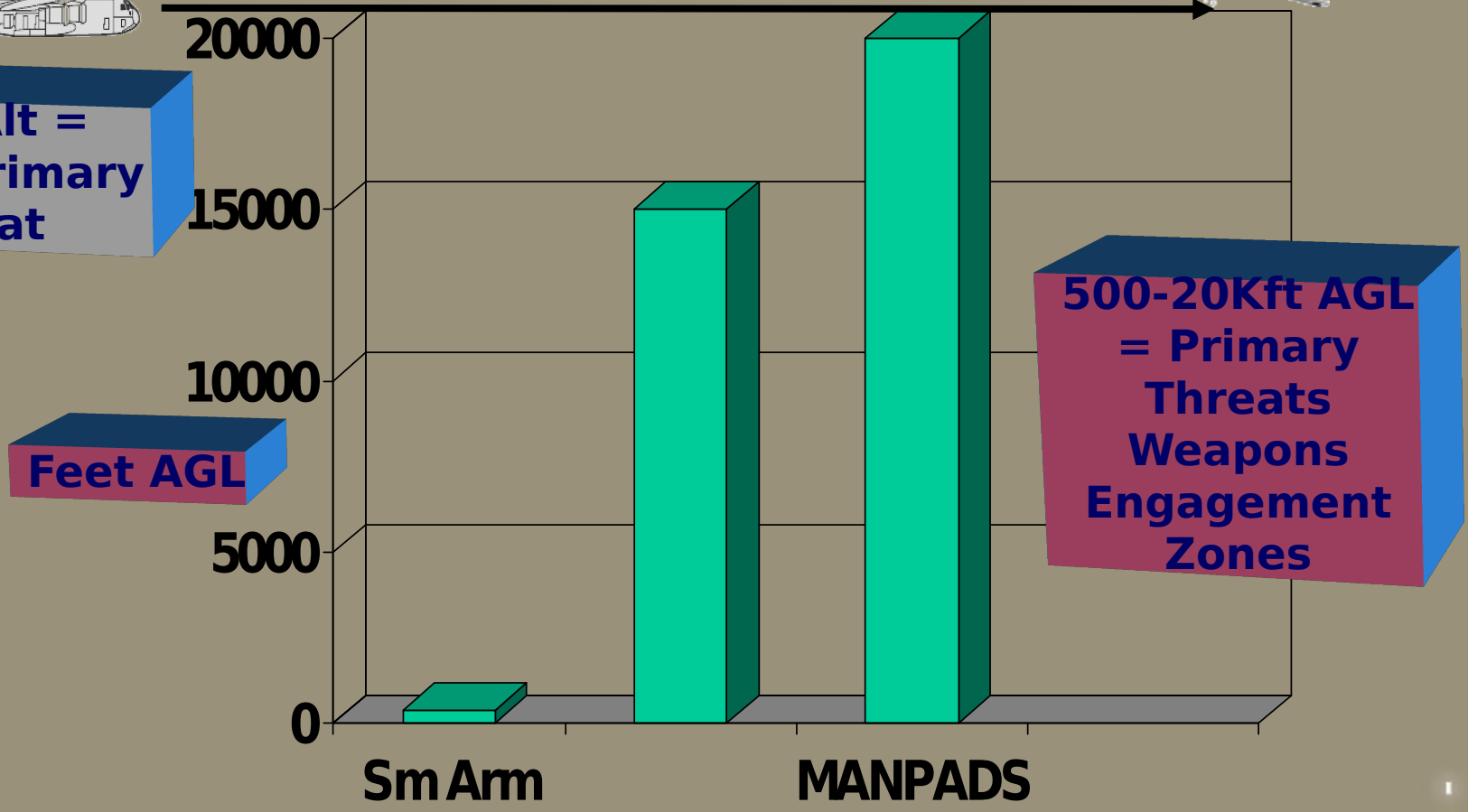
ECDS

HEMMT/CROP

FCS

JPADS BENEFITS TO DELIVERY FORCE

High Alt = Above Primary Threat



500-20Kft AGL = Primary Threats Weapons Engagement Zones

Operation ENDURING FREEDOM (SF EXPERIENCE)

"…one thing uniformly lousy: the 'precision' air drop of supplies. The C-130 folks had promised to go in at 400' to drop their stuff in a 100m circle. They instead flew at several thousand feet and often missed by half a mile."

"We can drop bombs right onto 10 digit grid locations, but miss with logistics drops by half a mile. We need the equivalent of JDAM for logistics drops."

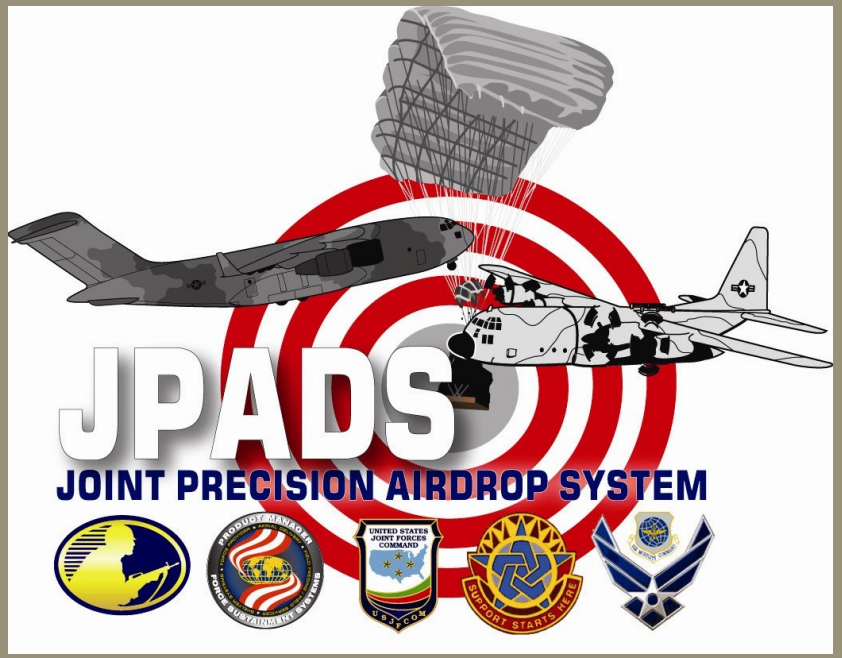
Operation IRAQI FREEDOM

“This [Iraq] environment has demonstrated a compelling case for going beyond the traditional sustainment requirements that have an aerial delivery linkage. For instance, every truck we put on the road is vulnerable, including trucks delivering mail. Use of a precision airdrop (perhaps bundles from helicopters flying above the manpad and RPG threat level and offset from the target) seemed kind of whacked out a few months ago. No longer. Likewise, delivery of rations and water to places where we could drive, but choose not to due to the ground threat, seem commonplace here.”

Brig Gen West, CJTF-7 C-4 (Nov 03)

JPADS TEAM

- JFCOM Sponsoring COCOM
- USA Natick Technology Lead
- USA CASCOM Lead Service
- AF AMC Partner Service
- US Army PM-FSS, Army Transition Manager
- USMC, SOCOM (many interested players)
- NATO – Involvement and Interest Growing



HIGH ALTITUDE PRECISION AIRDROP

THE JOINT CHALLENGE

- Air Force Capability Gaps
  - Employ Above and/or Outside of Primary Threat Envelope
- Air Force Challenges
  - Wind Collection / Analysis for Computing Release Point
  - Data Transfer to Airdrop Platform
  - Real Time Feedback on Airdrop Accuracy
- Army Capability Gaps
  - Accurate Delivery for Employment / Sustainment of Combat Operations
  - Multiple DZs Per Pass
- Army Challenges
  - Parachute / Parafoil Development
  - Guidance / Steering System

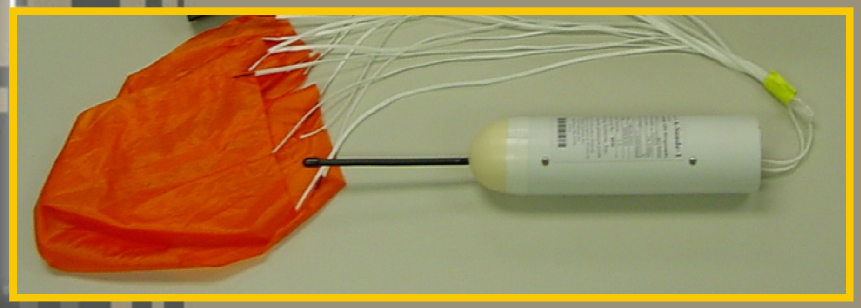
JPADS MISSION PLANNER

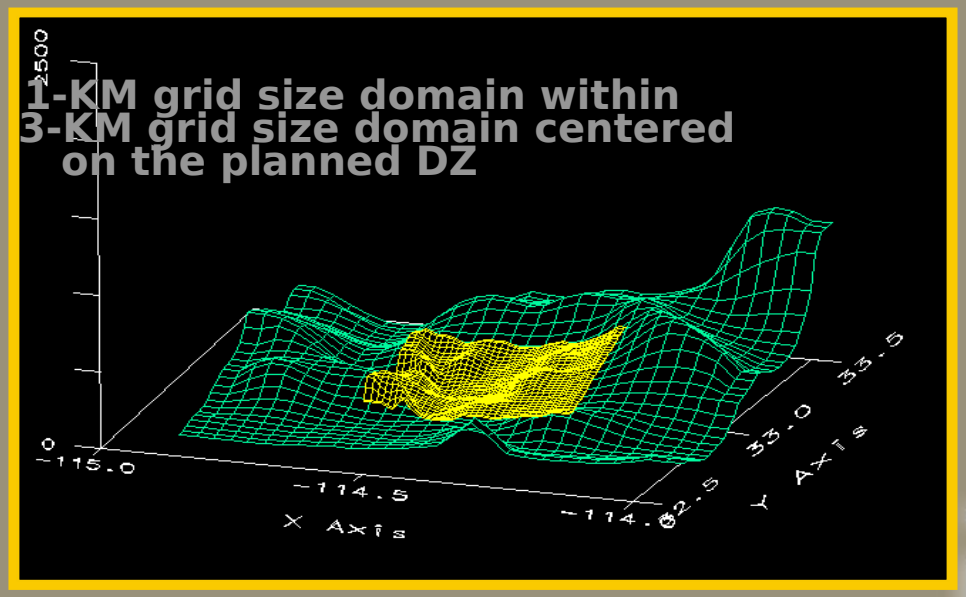
- **Laptop Based**
- **Incorporates the Existing Planner Interfaces**
- **Common for All High Alt Airdrop**
  - Ballistic
  - Guided
- **Candidate System**
  - USAF Precision Airdrop System (PADS)

Team: Planning System Inc, Draper Labs, Forecast Systems Labs

MISSION PLANNER
(WEATHER CAPABILITIES)

- **High-Resolution Atmospheric Forecast Model**
  - **Generated at an Operational Weather Center (AFW**
  - **High-Resolution Nested Grid Surrounding DZ**
  - **Atmospheric Flow Driven by Mountainous Terrain**
  - **Real Time In Situ Environmental Soundings**
    - **Hand Launched DropSondes –UHF MetBand**





AF WEATHER AGENCY SUPPORT

Welcome to JAAWIN
JOINT AIR FORCE & ARMY WEATHER INFORMATION NETWORK

on 24 May; new capabilities. See Hot News

Services | Alaska | CONUS | S. America | Europe | Asia | SW Asia | Africa | Australia | Oceans | Hemisphere

Precision Airdrop

- 1D Vertical Profiles
- 3D Gridded Fields

Downloads ASCII 1D vertical profiles of forecast winds, ballistic winds, pressures, temperatures and D-Values for the planned Point of Impact (PI)

Downloads 3D gridded fields at available forecast valid times of forecast winds, pressures and densities.

1. **Enter Lat/Lon of Planned Point of Impact (PI)**

Lat [ ] [N/S] DD MM.M

Lon [ ] [E/W] DDD MM.M

Format: North (N) or South (S) Latitude, East (E) or West (W) Degrees_Minutes.Decimal Minute, space between entries

2. **Enter Forecast Period**

Beginning [ ] DATE MON HH.MM

End [ ] DATE MON HH.MM

Format: Date Month (JAN, FEB, MAR, APR, ...) Hour (HH) Minute (MM), space between entries. Date/Time is Greenwich Mean Time (GMT)/Zulu (Z)

Download Data

Methodology for Extracting Model Data

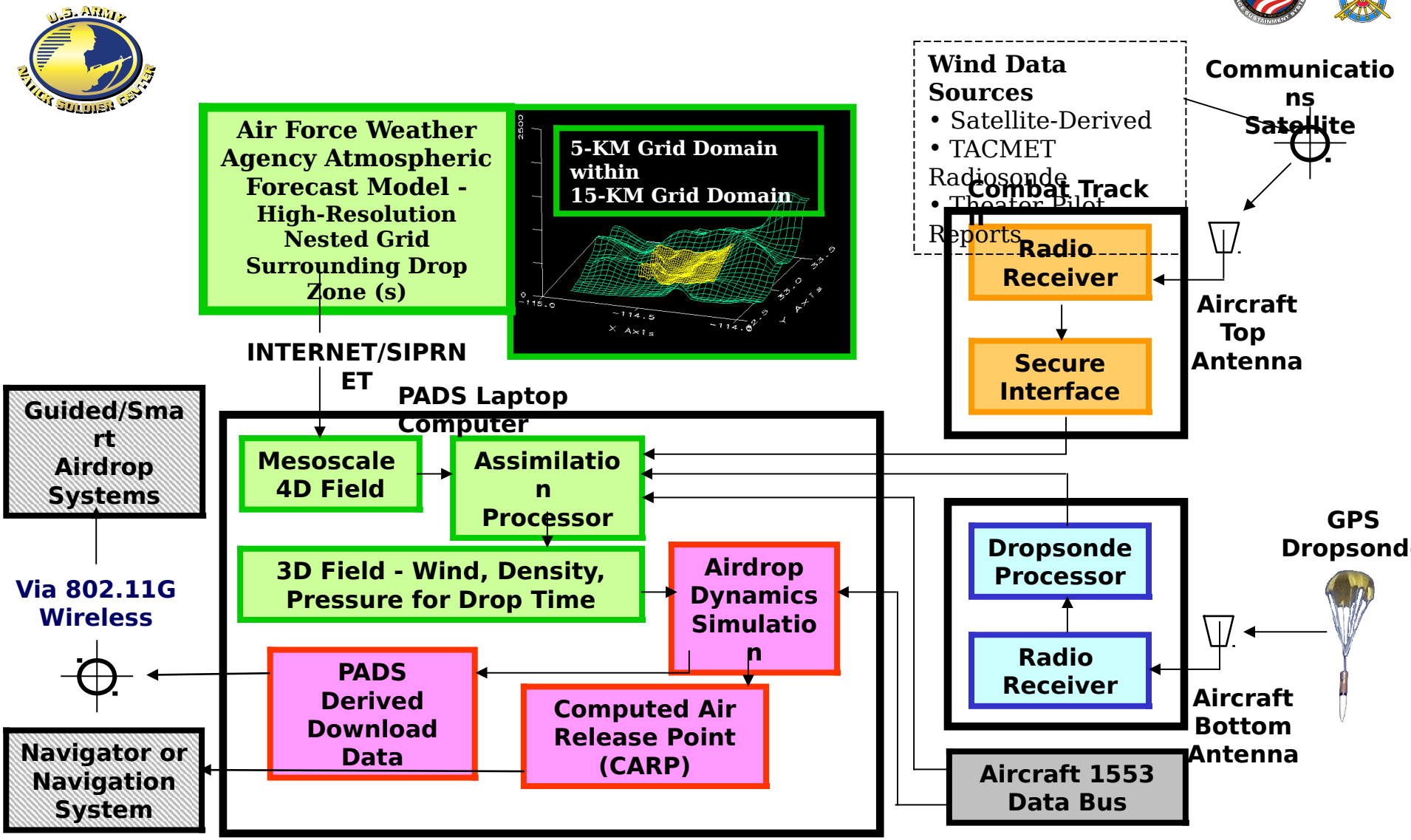
Display a horizontal status bar indicating completion of the download.

For example:

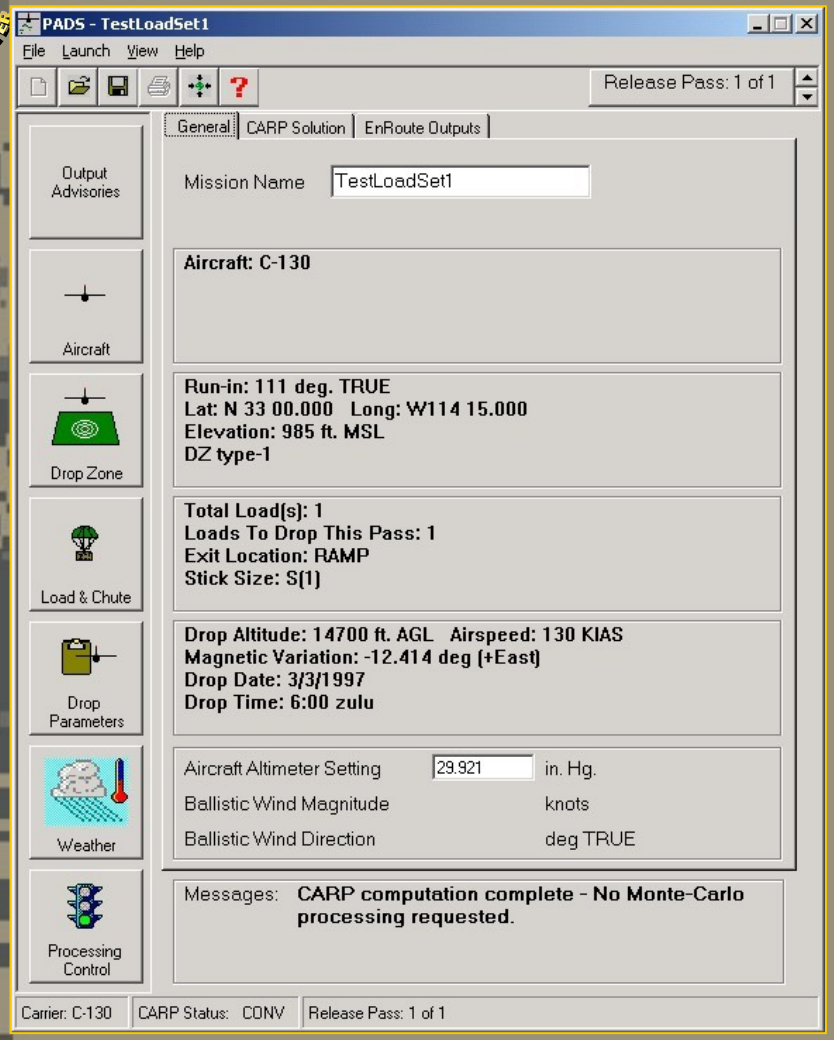
Download Data

Downloading Forecast Data for
Latitude: **W 114 45.6**
Longitude: **N 35 23.2**
Begging Forecast: **11 JUN 21Z**
End Forecast: **12 JUN 00Z**
Forecasts Valid Every **3** Hours

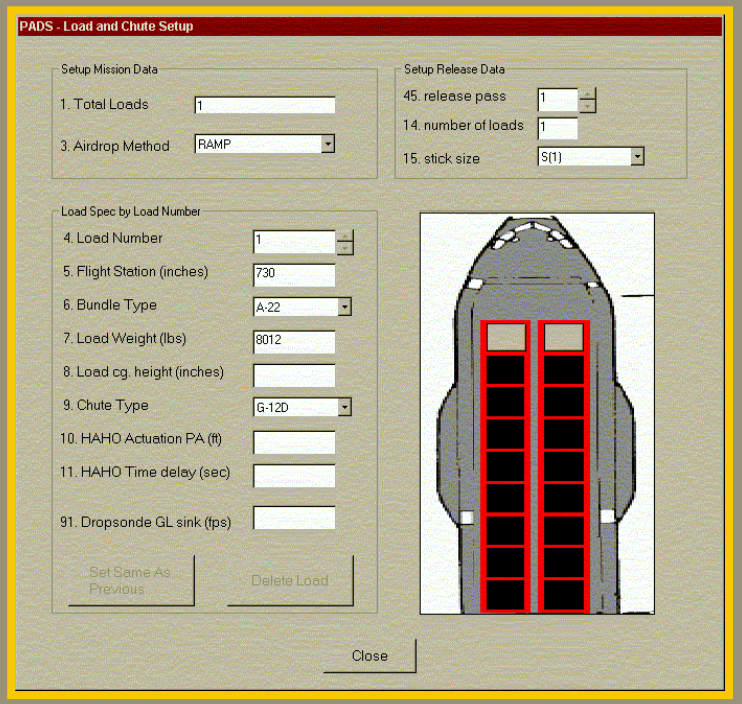
CONNECTIVITY AND DATA FLOW OF PADS COMPONENTS



PADS USER INTERFACE
(PFPS LIKE)

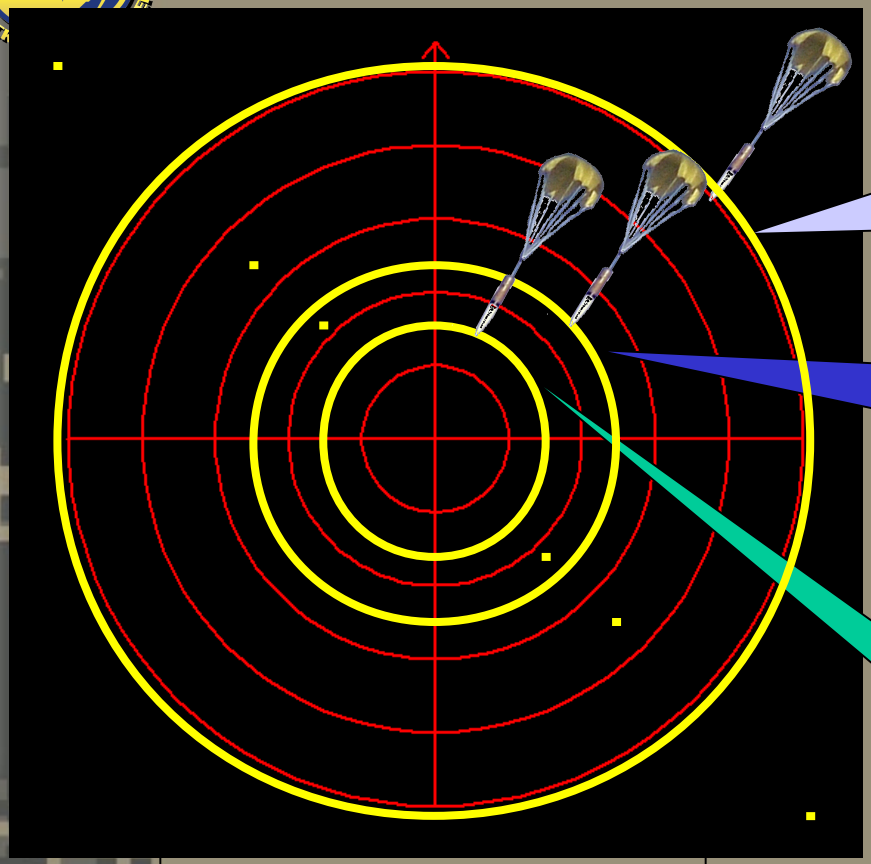


Technical Planning In Progre for Migration to the Joint Mission Planning System (JMPS)



PADS EFFECTIVENESS

OPERATIONAL UTILITY EVALUATION C-17



Range Rings = 200m

MC w/ PREFLIGHT WINDS = 1036

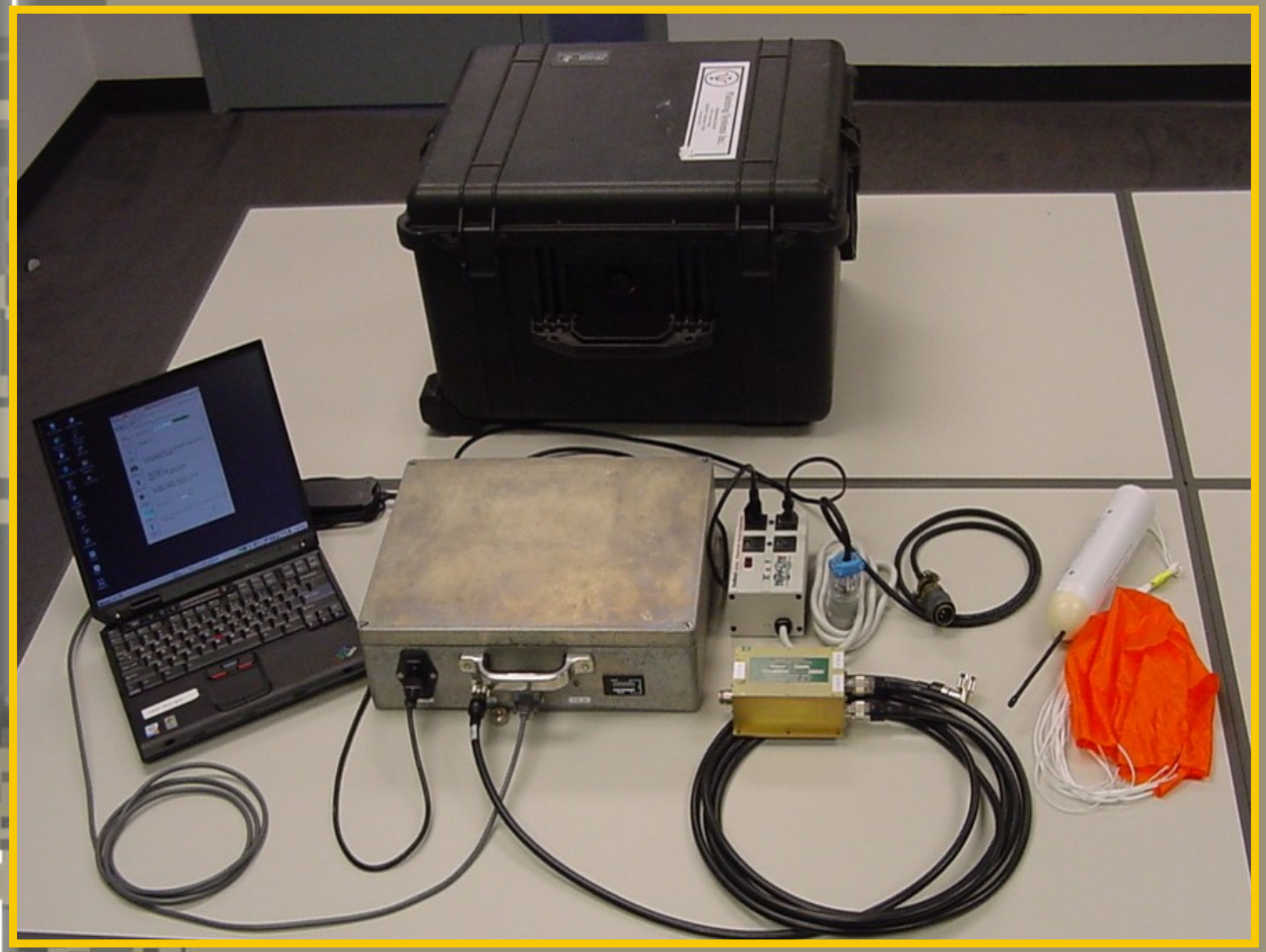
MC w/ PADS WINDS = 486

PADS = 308

CEA in Meters From FL 180-250

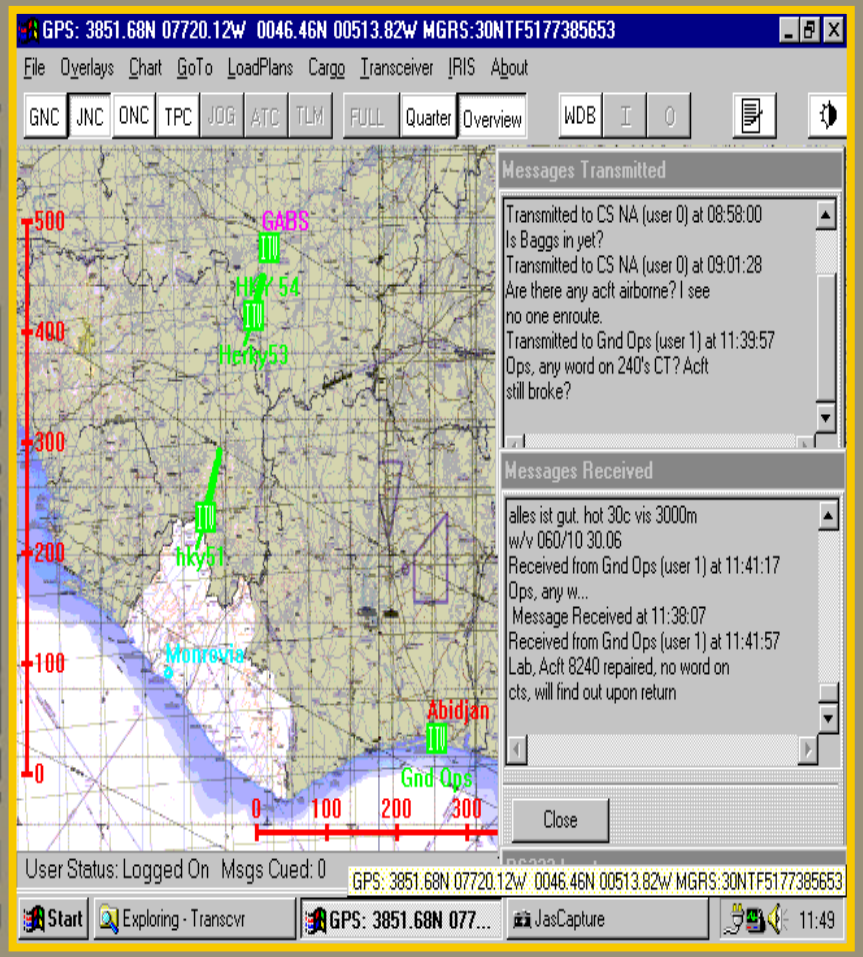
70% IMPROVEMENT OVER CURRENT METHODS

CURRENT PADS KIT



- **Software (common mission planner)**
- **Hardware (GPS Retransmission, Dropsondes)**

COMBAT TRACK II (AMC SOLUTION)



- **PADS / CTII Interface Integration**
  - Single Computer
- **Capabilities**
  - Secure Two-way Messaging
  - Mission Updates
  - Accurate Flight Following
  - Integrate Graphical Map Interface

PADS → JPADS

2K

10K

PERSONNE

30-60K

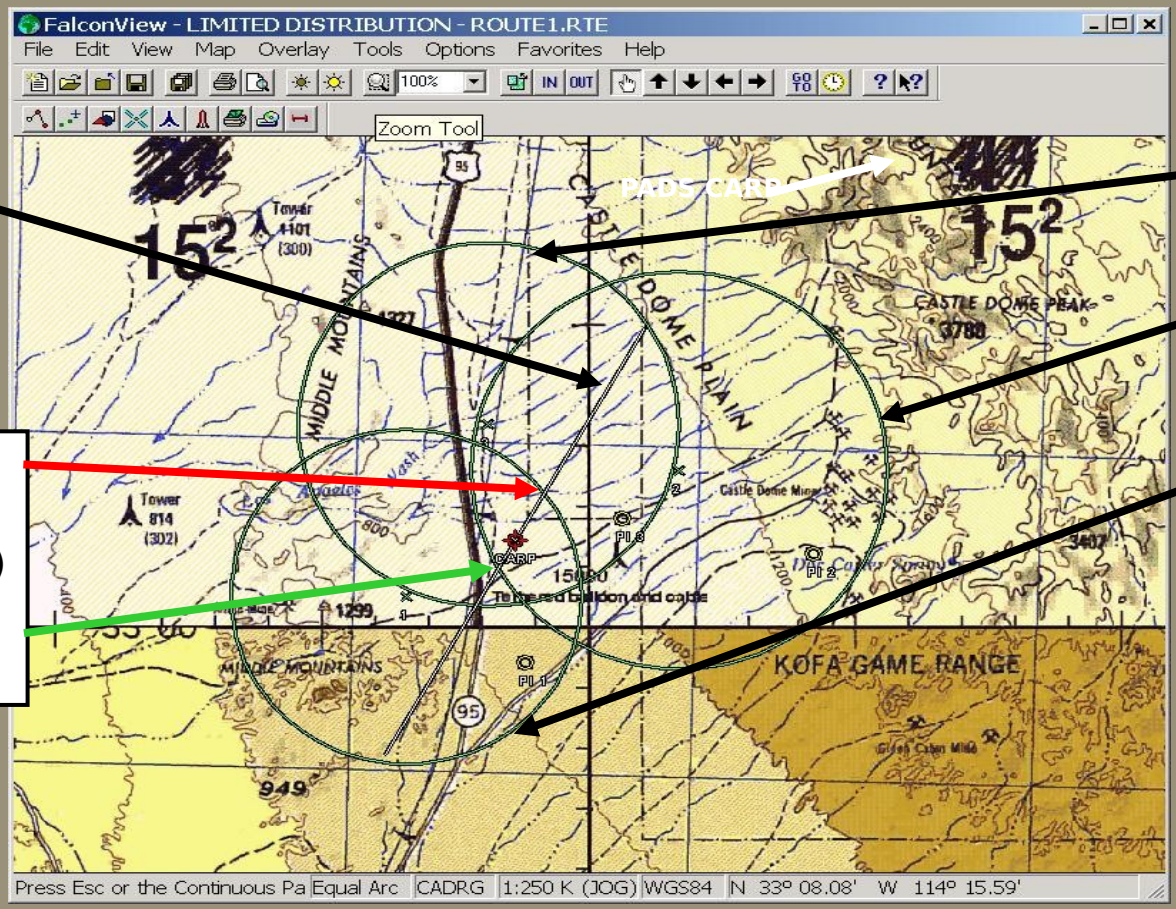
30K

Must Link to Guided 'Precision' Systems to Truly Revolutionize Airdrop

EXAMPLE "SMART" PADS DISPLAYS (Under Development)

Planned Aircraft Track

Start Point (Green) & Endpoint (Red) for system releases



Three separate PI's (Centers of circles) for 3-"smart" systems

Map Display

TRANSFORMATION

- **US TRANSCOM Technology Transformation Initiative**
  - Providing Key Linkage of the JPADS Mission Planner (PADS) to JPADS 2K Candidate Systems
  - Wireless Communications w/in Aircraft – Planner-to- Load
  - Guidance Software Transfer – Mission File Transfer
  - Advancing Planner Graphical User Interface
  - Testing

JPADS DECELERATORS

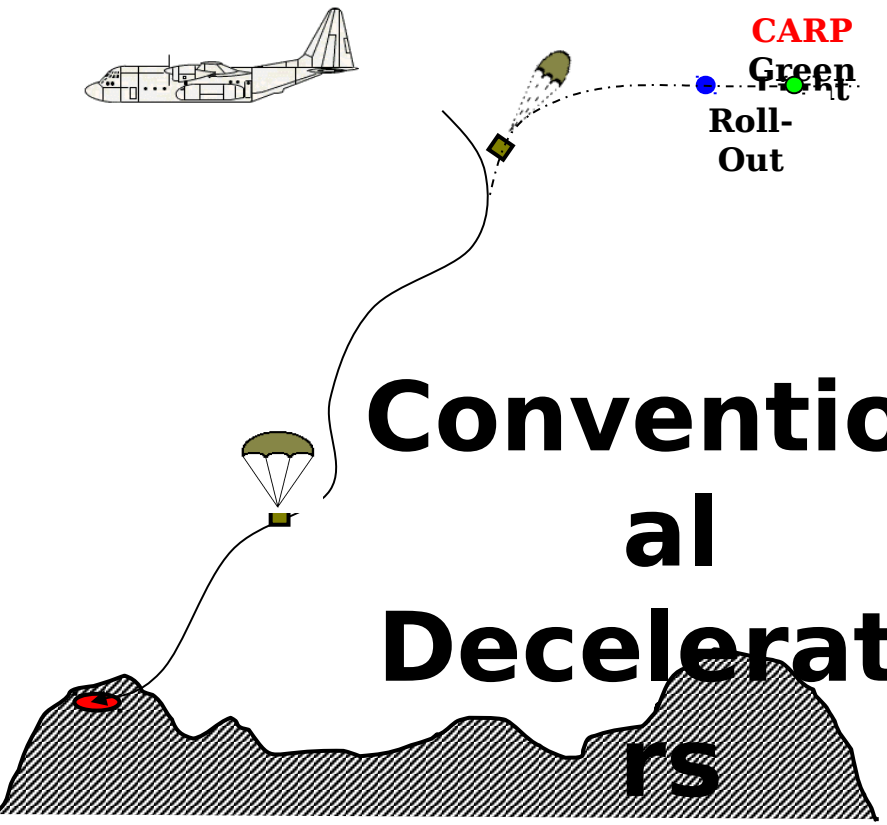
- **Primary Focus of USA Combat Arms Support Command (CASCOM)**
  - Technology Lead is USA Natick Laboratories

+

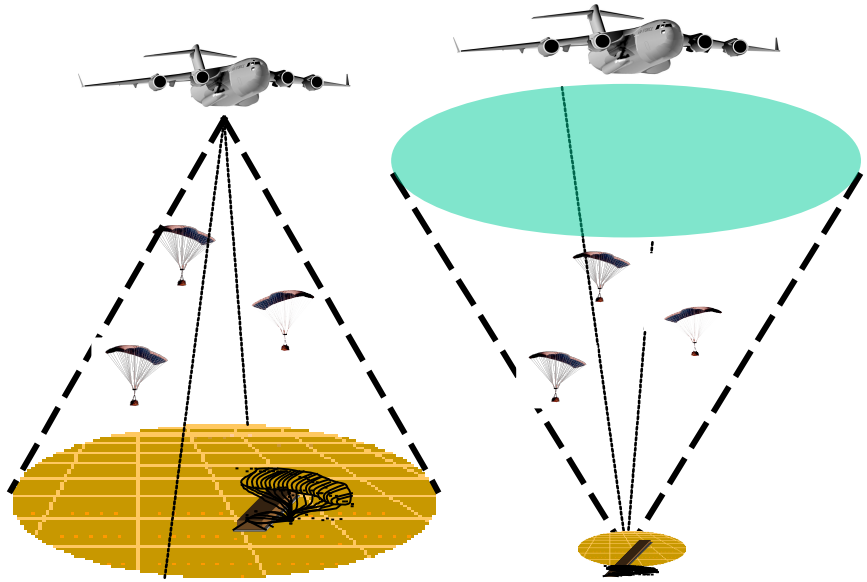
= **JPADS**

- **2K Candidates**
  - MMIST Sherpa
  - Capewell AGAS
  - Strong Screamer
  - Others
- **10K Candidates**
  - DragonFly (Large Parafoil)
  - Strong Screamer

CONVENTIONAL v. GLIDE



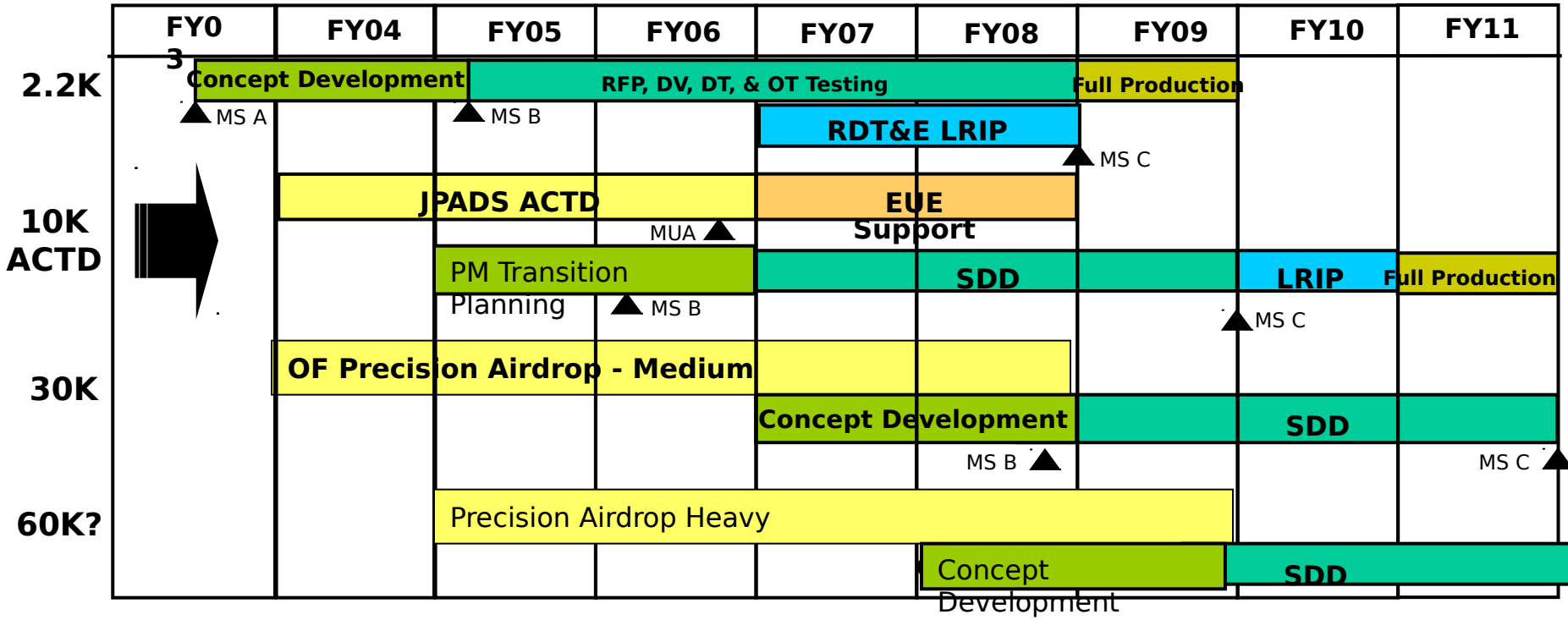
Conventional Decelerators



JPADS!

JPADS Schedule

Natick Soldier Center / PM Force Sustainment Systems

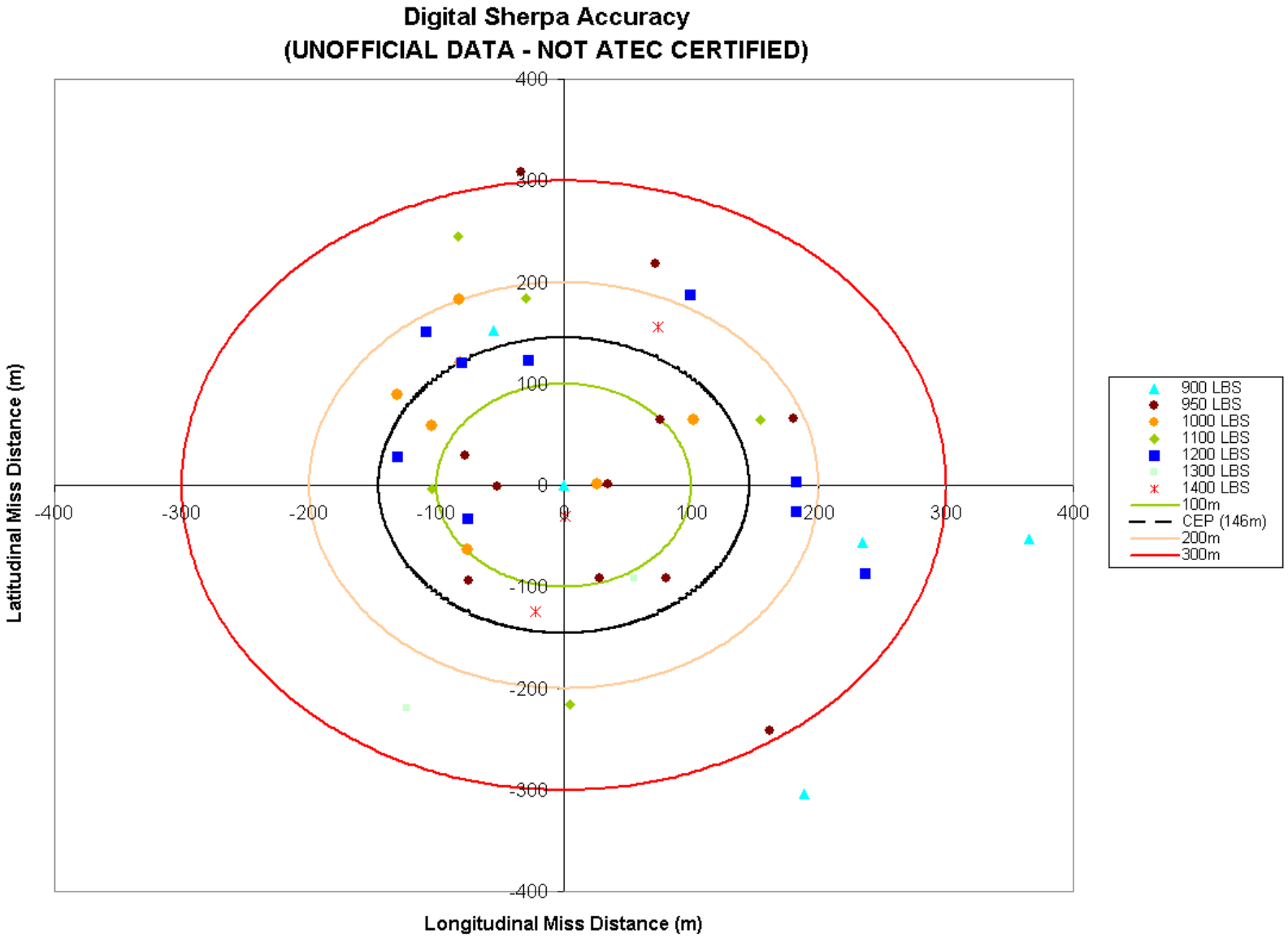


MMIST SHERPA

- **150 (Cargo 50 - 200 lbs) SnowBird**
  - (Cargo 0 – 165 lbs) Sherpa (Training System)
- **400 (Cargo 200 – 500 lbs) SnowBird**
  - Cargo 180 - 500 lbs) Sherpa
- **900 (Cargo 700 – 1,200 lbs) Sherpa**
- **1200 (Cargo 1,200 – 2,000 lbs) Sherpa**

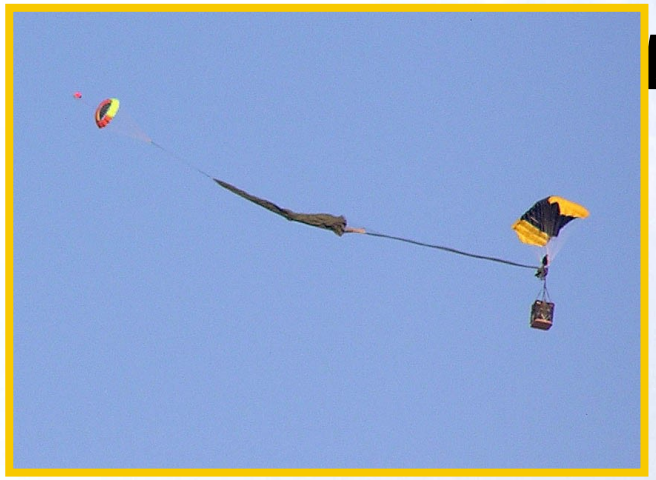
MMIST SHERPA SYSTEM
4-SHERPA DEPLOYMENT

SHERPA SYSTEM RESULTS (PM-FSS)



2K SCREAMER Delivery System

Enterprises & Robotek Engineering



- More than 100 autonomous drops
- Typical accuracy to date <75 meters
- Demonstrated weight 500 - 2200 lbs
- Demonstrated offset 3.5 miles
- Wind penetration >50kts
- Glide 2-2.7:1 in zero winds

TARGET

500-2KLB SCREAMER SYSTEM

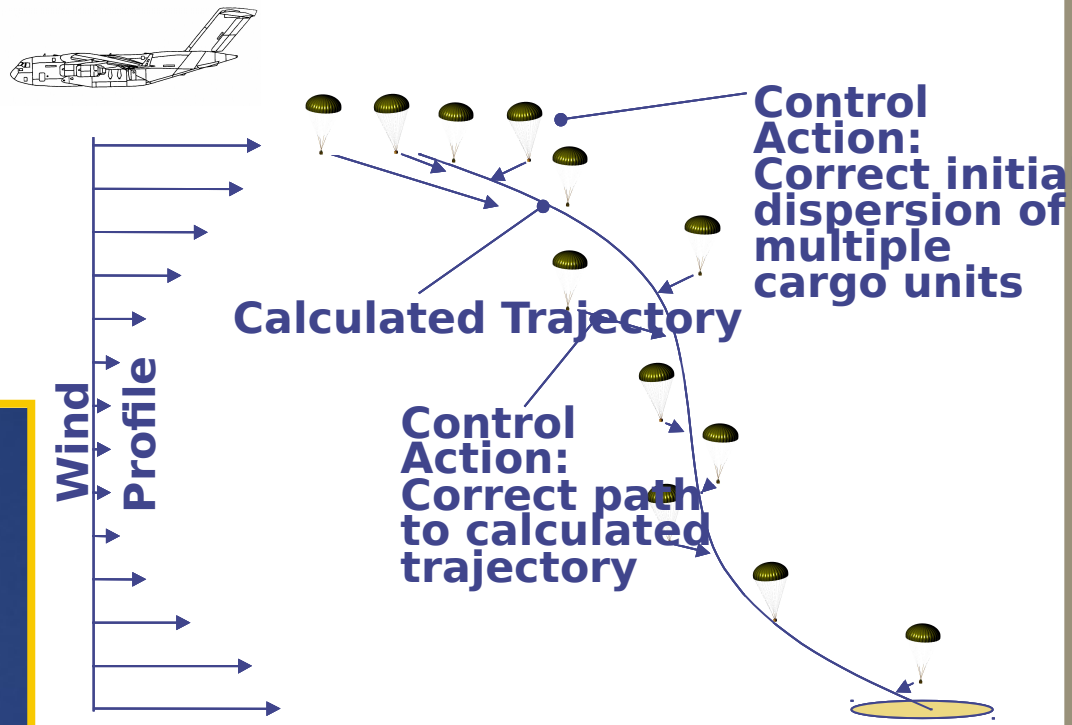
CAPEWELL & VERTIGO

Affordable Guided Airdrop System (AGAS)

Guidance System "kit" for CDS

- G12 Parachute
- 2,200 lb Payload
- A-22 Compatible
- Low Cost
- Accuracy: <100 m CEP

AGAS Mission Profile


Wind Profile
Calculated Trajectory
Control Action: Correct initial dispersion of multiple cargo units
Control Action: Correct path to calculated trajectory

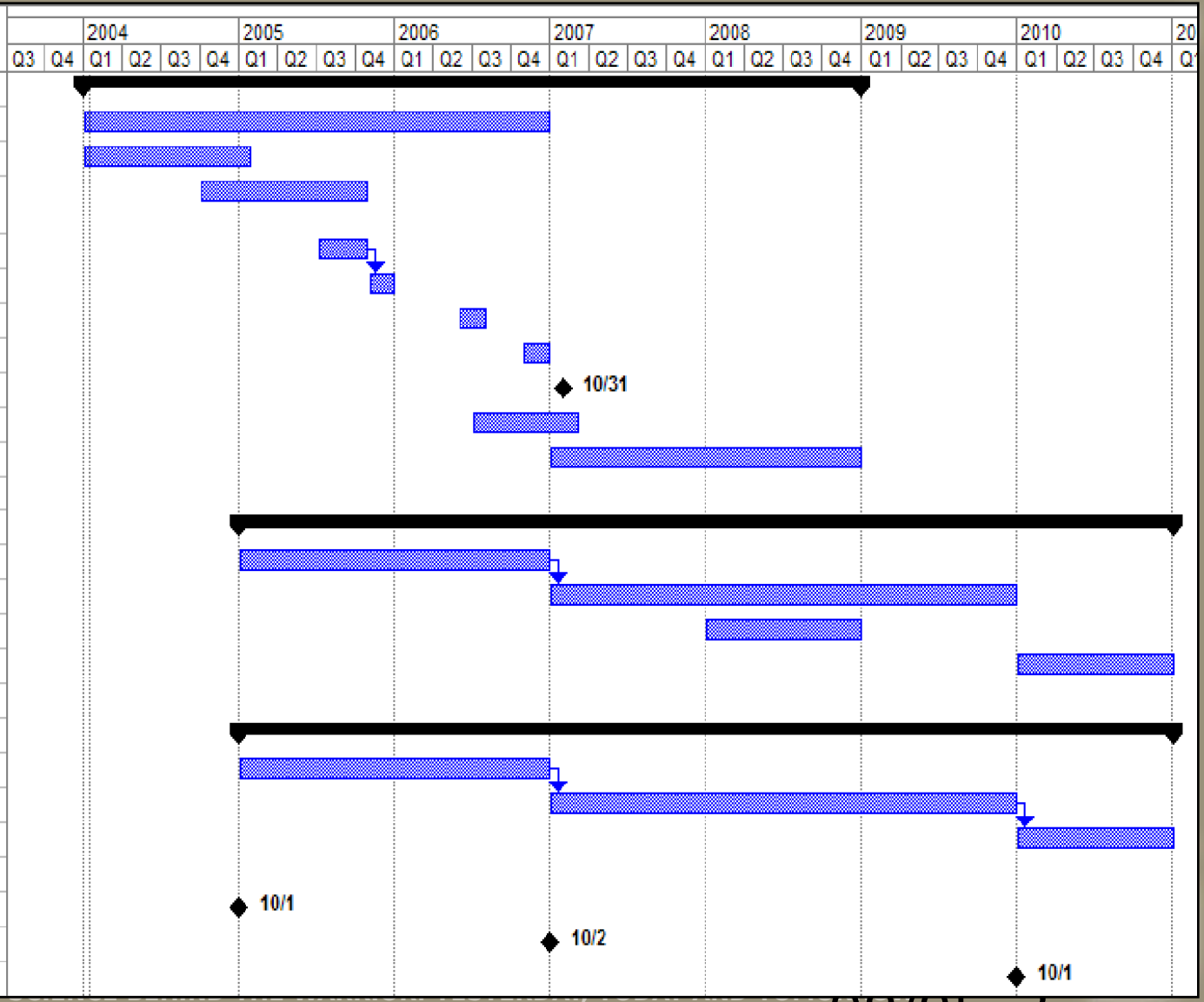
CAPEWELL & VERTIGO AGAS

Drop#	Date	Weight	Miss Distanc
1	7/27/04	1625	21
2	7/27/04	1625	33
3	7/27/04	1625	91
4	7/27/04	1625	70m
5	7/28/04	1625	30m
6	7/28/04	1625	35m
7	7/28/04	1625	30m
8	7/28/04	1625	84
9	7/29/04	1625	75
10	7/29/04	1625	14
11	7/29/04	1625	45

AVERAGE MISS DISTANCE 48m

JPADS ACTD Schedule

ID	Task Name
1	**JPADS ACTD**
2	TTP/CONOPS Development
3	Prototype Fabrication
4	System Integration / Technical Testing
5	User Training
6	Military User Assessment 1
7	Military User Assessment 2
8	Military User Assessment 3
9	Military User Assessment Report
10	Extended User Evaluation Training
11	Extended User Evaluation Support
12	
13	**Option A**
14	PM Transition Planning
15	SDD
16	RDT&E LRIP
17	Full Production
18	
19	**Option B**
20	PM Transition Planning
21	SDD
22	LRIP
23	
24	Milestone A
25	Milestone B
26	Milestone C

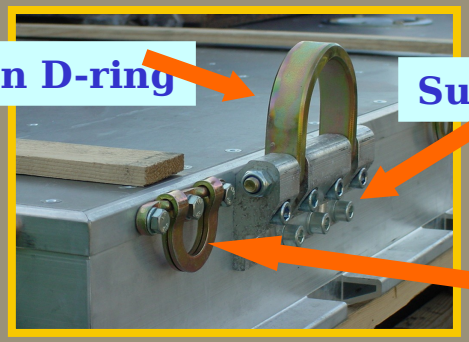


10K JPADS

INCORPORATES ENHANCED CDS PALLET

PM-FSS Program
SEABOX Platform

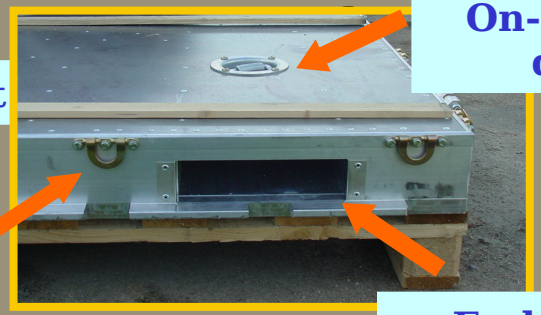
- Size 108 in x 88 in
- Compatible with C-130 & C-17 locks & rails
- Four way fork lift capability
- Weight 575 lbs
- All Aluminum Riveted construction



Suspension D-ring

Suspension Bracket

Tie down rings



On-deck tie down

Fork Tube

DRAGONFLY PROGRAM

Contractor Team

Parachute System
Para-Flite Inc.

Airborne Guidance Unit
Wamore Inc.

Avionics
Robotek Engineering

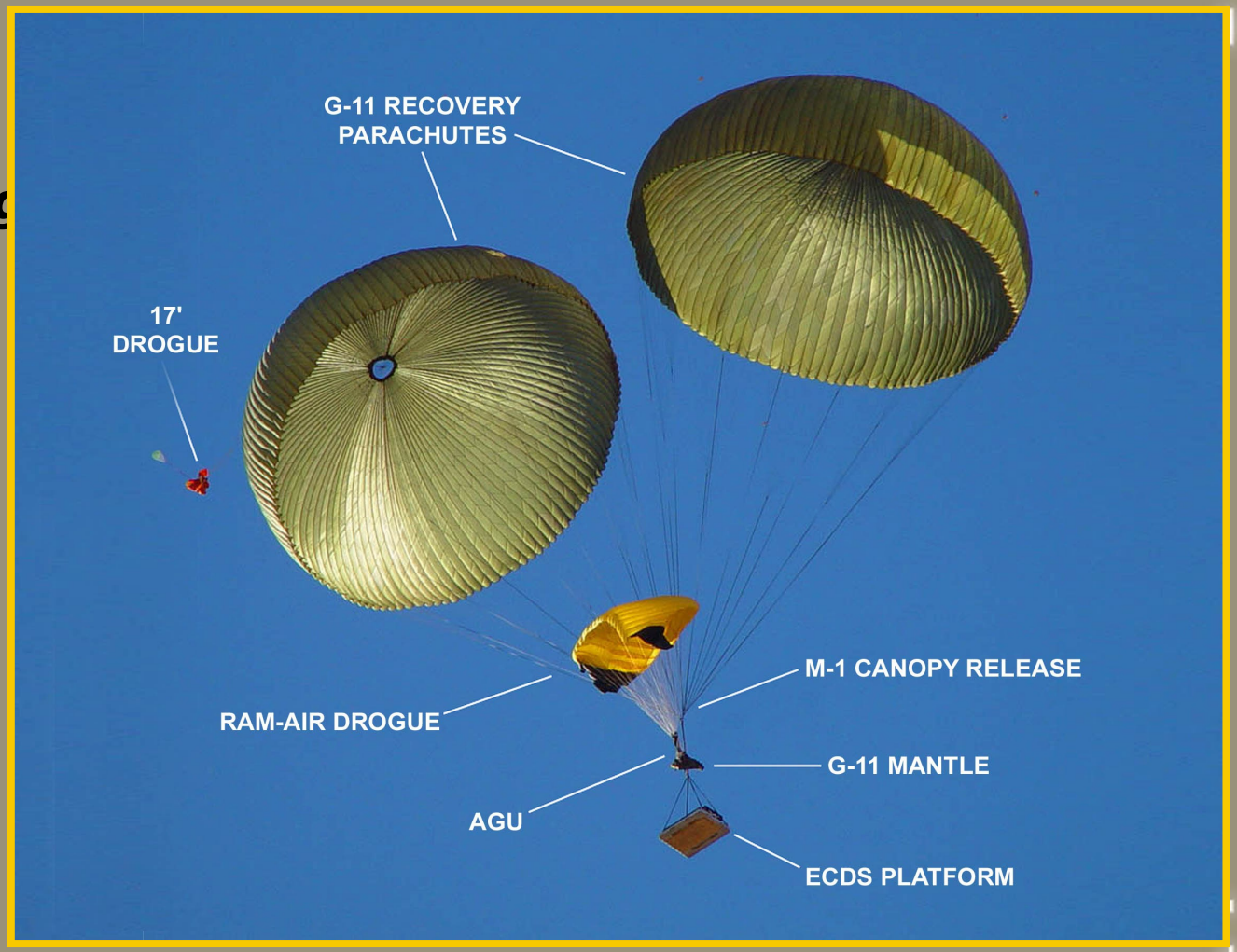
GN&C Software
Draper Laboratory

DRAGONFLY PROGRAM

10Klb SCREAMER

Prime: ***Strong Enterprises***

GN&C SUB: ***Robotek Engineering***



STRONG SCREAMER

Fundamental System Components

650sf Ram Air Drogue
76 lbs

Autonomous
Airborne Guidance Unit
45 lbs

Recovery Mantle
40 lbs

G-11 Recovery Parachutes x2
250 lbs ea.

Load
Isolation Swivel
25 lbs

10K system weight 686 lbs. +*ECDS*

10K JPADS SCREAMER

RELATED EFFORTS

- **CENTCOM Urgent Operational Needs Statement**
- **Additional 2K JPADS Rapid Fielding Expected in FY05**
  - Sherpas, Screamers, & AGAS expected
- **NATO Demonstration Interest**
- **Precision Airdrop Technology Conference and Demonstration (PATCAD)**
- **Integration Logistics Aerial Resupply (US Army G-4)**

CENTCOM URGENT OPERATIONAL NEEDS STATEMENT

- **9 AUG 04 (Western Iraq)**
  - Two systems released individually
  - Altitude: 7.5K (DZ elevation included)
  - Offset: 2.9 Kms
  - Weight: 1,200 lbs tota rigged weight
  - Accuracy: 94 and 168 meters from IP

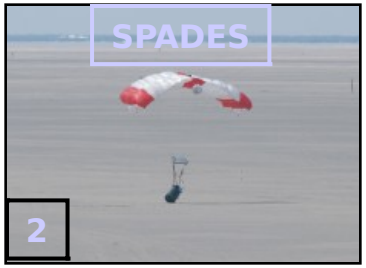
PM-FSS PROGRAM

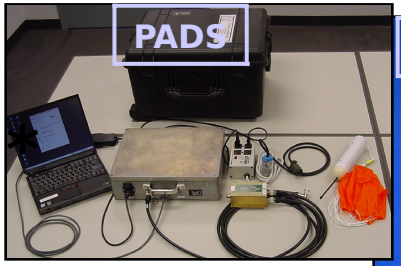
Status: 9 Drops CEA ~65 meters

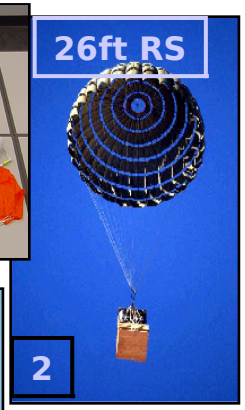
PRECISION AIRDROP CAPABILITIES DEMONSTRATION (PACD)

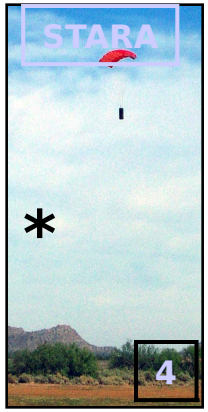
3 Aircraft; USA: C-130; BEL: C-130; DEU: C-160

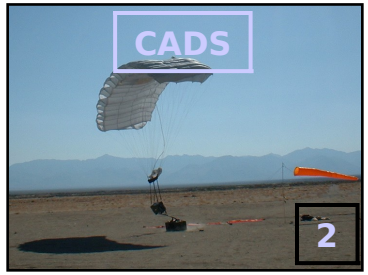
Supporting Nations

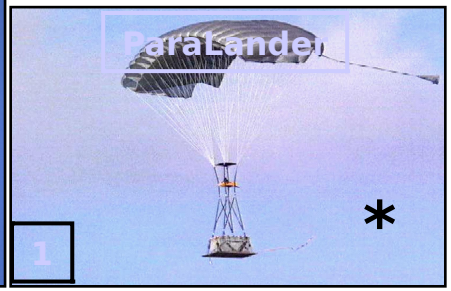


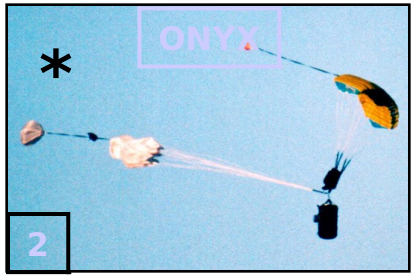


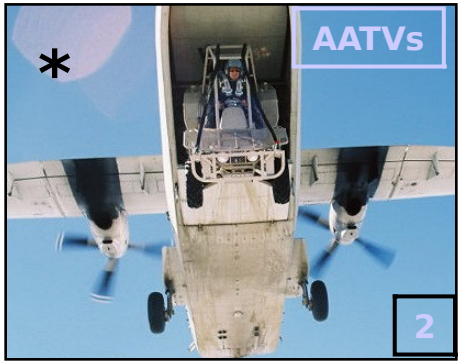












Attending/Interest

Precision Airdrop Technology Conference and Demonstration

Supported by Multiple DOD Agencies and Contractors

TAKEAWAYS

- **JPADS-MP Provides Improved High-Alt Resupply Capability**
- **JPADS MP – Link to JPADS Smart Systems**
- **2K Near Term Useable – 10K ACTD Focus**
- **FY05 Significant AOR Interest – Should be A Wild Ride!**

JPADS – THE JDAM FOR LOGISTICS!